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PATENT

Docket No.: 50346-027

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of

Michael SANDLIN, et al.

Application No. 09/832,181

Filed: April 11, 2001

Group Art Unit: 1753

Examiner: Rodney G. McDonald

For: MECHANICALLY ALLOYED PRECIOUS METAL MAGNETIC SPUTTERING
TARGETS FABRICATED USING RAPIDLY SOLIDIFIED ALLOY POWDERS AND
ELEMENTAL Pt METAL

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants herein appeal from the final rejection of claims 14, 16 and 18-24.¹ This Appeal Brief is submitted in triplicate and in support of the Notice of Appeal filed August 13, 2000.

Real Party in Interest

This application is assigned to Heraeus, Inc. by assignment recorded on August 22, 2001, at Reel 12096, Frame 0560.

¹ Claims 27 and 28 were new claims added by an amendment after final. While the Examiner listed claims 27 and 28 among the claims rejected and indicated "that the amendment has been entered but the claims would be rejected over the combination of references cited," he did not explicitly specify which rejections applied to the new claims. Therefore the status of claims 27 and 28 is not clear from the record.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 14, 16, 18-24, 27 and 28 are pending herein. Claims 1-6, 11-13, 15, 17, 25 and 26 have been canceled. Claims 7-10 have been withdrawn from consideration due to a restriction requirement. No claims have been indicated as being allowable. A copy of claims 14, 16, 18-24, 27 and 28 on appeal are found in the Appendix. In the Appendix, independent claim 27 and dependent claim 28 have been presented out of order and placed before their respective dependent claims 14, 16, 18-24 and 28 in order to facilitate a clearer understanding of the claimed invention.

Status of Amendments

All amendments filed in this case have been entered, including the amendment filed after the final rejection.

Summary of Invention

The invention is directed to a precious metal sputtering target which comprises a mechanically alloyed, chemically homogeneous cobalt alloy composition that has microstructural homogeneity. The alloy components include Co, Pt, Cr, and at least 2 atomic % boron. The objective of the invention is to achieve enhanced sputtering target characteristics through utilization mechanical alloying to provide a novel microstructure of the alloy.

Issues

1. In the final rejection, claims 11, 14, 15, 17 and 26 were rejected under 35 U.S.C. § 102(b) as being anticipated by Saito et al. (Japanese Publication No. 10-88333). Claims 11, 15, 17 and 26 were canceled in the Amendment Under 37 CFR § 1.116 submitted after the final rejection, thereby rendering the rejection as to these claims moot. Therefore, the issue is whether claim 14 is *prima facie* anticipated by the Saito et al. reference.

2. In the final rejection, claims 11-20 and 24-26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito et al. in view of Takashima (U.S. Patent No. 6,406,600). Claims 11-13, 15, 17, 25 and 26 were canceled in the Amendment Under 37 CFR § 1.116 submitted after the final rejection thereby rendering the rejection as to these claims moot. Claims 14, 16, 18-20 and 24 were amended to be dependent on new claims 27 and 28. In the Advisory Action, the Examiner stated, without specifying this rejection, "that the amendment has been entered but the claims would be rejected over the combination of references cited." Since there is no explicit indication by the Examiner in the Advisory Action that new claims 27 and 28 are included with this rejection, the issue is whether claims 14, 16, 18-20 and 24 are *prima facie* obvious over the combined teachings of Saito et al. and Takashima.

3. Claims 11 and 21-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito et al. in view of Bartholomeusz et al. (U.S. Patent No. 6,514,358). Claim 11 was canceled by the Amendment Under 37 CFR § 1.116 submitted after the final rejection thereby rendering the rejection as to this claim moot. Claims 21-23 were amended by the Amendment Under 37 CFR § 1.116 to be dependent on new claims 27 and 28. In the

Advisory Action, the Examiner stated, without specifying this rejection, "that the amendment has been entered but the claims would be rejected over the combination of references cited." Since there is no explicit indication by the Examiner in the Advisory Action that new claims 27 and 28 are included with this rejection, the issue is whether claims 21-23 as amended are *prima facie* anticipated by the combined teachings of Saito et al. and Bartholomeusz.

Grouping of Claims

Appellants respectfully submit that the claims on appeal do not stand or fall together for reasons set forth in the Argument below.

Argument

The final rejection included four rejections: claims 20-23 were rejected under 35 U.S.C. § 112; claims 14 was rejected under 35 U.S.C. § 102(b); claims 14, 16, 18 and 24 were rejected under 35 U.S.C. § 103(a); and claims 21-23 were rejected under 35 U.S.C. § 103(a).

Rejection Under 35 U.S.C. § 112

Claims 20-23 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because these claims are dependent on a non-elected invention. These claims in the final rejection were inadvertently made dependent on claim 7, a non-elected invention. In an Amendment Under 37 CFR § 1.116 submitted after the final rejection, the claims were amended to be dependent on new claim 28. In the Advisory Action (Paper No. 12), the Examiner did not indicate the status of this rejection. Upon filing a Notice of Appeal, the Advisory Action indicated that the Amendment After Final was entered. Since the claims are no longer dependent

on a non-elected claim, it is believed that the rejection has been overcome. Accordingly, the rejection should not be sustained.

Rejection Under 35 U.S.C. § 102(b)

Claim 14 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Saito et al. (Japanese Publication No. 10-88333). Claim 14 is dependent on claim 27, which recites the alloy as being a precious metal magnetic sputtering target comprising a mechanically alloyed, chemically homogeneous alloy composition having microstructural homogeneity, said alloy composition comprising Pt, Co, Cr, and at least 2 atomic % boron. Independent claim 27 was added after the final rejection. Even though the Examiner indicated that the amendment after final would be entered, he did not explicitly indicate the status of claim 27 with respect to this rejection. He indicated in the Advisory Action "that the amendment has been entered but the claims would be rejected over the combination of references cited." However, claim 27 was not rejected in the final Office Action. Therefore, claim 27 is presumed to be allowable over the prior art. If claim 27 is allowable, then all of the claims dependent thereon are allowable.

Assuming *arguendo* that claim 27, like claim 14, is anticipated by Saito et al., the following arguments are presented for patentability. According to the Examiner, "Saito et al. teach mechanically alloying and HIPing to form sputter targets" and "Saito et al. teach a homogeneous target." Saito et al. disclose forming only a CoCrPt or CoCrTaPt alloy by mechanical alloying. Saito et al. do not disclose forming a cobalt alloy having at least 2 atomic % boron, let alone an alloy comprising CoCrPtB or CoCrTaPtB, by mechanical alloying. Saito et al. also do not disclose an alloy containing the multiple phases required by claim 14. Saito et al.

disclose that the sputtering target formed by their process is a homogeneous mixture of an alloy and a ceramic phase, and not a homogeneous alloy as required by the claims. The ceramic phase is not an alloy, but a separate component that is an oxide, carbide or nitride of an element such as boron (see page 3 of the translation of the Japanese publication). The present invention does not involve an alloy phase alloy powder and a ceramic phase powder. Accordingly, for all of the foregoing reasons, claims 27 and 14 are not anticipated by Saito et al.

Accordingly, it is respectfully requested that the Board find the decision by the Examiner to be in error and reverse the rejection.

Rejection for Obviousness Over Saito et al. and Takashima

Claims 14, 16, 18 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito et al. in view of Takashima (U.S. Patent No. 6,406,600). Claims 14, 16 and 24 have been amended to be dependent on new claim 27, which is directed to a precious metal magnetic sputtering target comprising a mechanically alloyed, chemically homogeneous alloy composition having microstructural homogeneity, said alloy composition comprising Pt, Co, Cr, and at least 2 atomic % boron. Claim 18 has been amended to be dependent on new claim 28, which is dependent on claim 27. Claim 27 limits the atomic % of boron to at least 6 atomic %.

Independent claim 27 and dependent claim 28 were added in an amendment after the final rejection. Even though the Examiner indicated that the amendment after final would be entered, he did not explicitly indicate the status of claims 27 and 28 with respect to this rejection. He indicated in the Advisory Action "that the amendment has been entered but the claims would be rejected over the combination of references cited." However, neither claim 27 nor claim 28 has

been rejected in the final Office Action. Therefore, claim 27 and 28 are presumed to be allowable over the prior art. If claims 27 and 28 are allowable, then all of the claims dependent thereon are allowable.

Assuming *arguendo* that claims 27 and 28 are not allowable over Saito et al. and Takashima for the same reasons given for the rejection of 14, 16, 18 and 24, the rejection is improper for the following reasons.

According to the Examiner, "Saito et al. teach mechanically alloying and HIPing to form sputter targets" and "Saito et al. teach a homogeneous target." Saito et al. disclose forming a CoCrPt or CoCrTaPt alloy. Saito et al. do not disclose or suggest forming an alloy containing at least 2 atomic % boron or at least 6 atomic % boron or a range of boron from 2 atomic % to 30 atomic %, respectively, as required by claims 27, 28 and 24, respectively, let alone an alloy comprising CoCrPtB or CoCrTaPtB, by mechanical alloying. Also, Saito et al. do not disclose the multiple phases required by claim 14. The arguments set forth *supra* in response to the anticipation rejection by Saito et al. are incorporated herein by reference.

Takashima does not make up for the deficiencies of Saito et al. While the secondary reference discloses sputtering targets comprising CoCrPtTaB (Takashima at col. 5:42-49 and col. 6:3-6), the reference teaches making this alloy by a conventional casting technique (Takashima at col. 6: 54-67), and not by mechanical alloying as required by claim 27. Appellants disclose and claim that mechanical alloying provides advantages over the conventional casting technique, e.g., increase in ductility and increased yields during thermomechanical processing, which translate into cost savings (specification at pp. 11-16).

According to the Examiner, the motivation for modifying Saito et al. by substituting an alloy disclosed by Takashima is "because it allows for obtaining high recording and reproducing characteristics as the recording layer of a magnetic disk." This motivation factor was not derived from the teachings of Takashima or Saito et al. because neither Takashima nor Saito et al. discuss high recording and reproducing characteristics of the recording layer of a magnetic disk so as to provide motivation for a person having ordinary skill in the art to modify Saito et al. from the teachings of Takashima.

The Saito process involves mechanical alloying of an alloy powder and a ceramic powder. Takashima does not disclose using a ceramic powder containing boron in the initial mixture from which the alloy is formed. Further, there is no suggestion in Saito et al. of mixing, for example, a CoCrTa alloy with a boron powder. There is no suggestion from the combined teachings of the references that a person having ordinary skill in the art would have expected that mechanically alloying, for example a CoCrTa alloy with boron, would have resulted in a sputtering target alloy having the characteristics asserted by the Examiner because there is no teaching that Saito process would produce sputtering targets having the asserted properties.

Moreover, the mechanical alloying leads to alloy powder mixtures with extremely low chemical variability relative to sputtering targets made using conventional casting techniques. As demonstrated in the Table on page 5 of the specification, the point-to-point chemical variability of a target made by mechanical alloying was significantly less than that of a target made by a conventional casting technique. Therefore, the data shown in the Table on page 5 would rebut any *prima facie* case of obviousness raised by the references. This feature of the

invention is not disclosed or suggested by Takashima or Saito et al., taken alone or in combination. Furthermore, neither Takashima nor Saito et al. disclose or suggest, alone or in combination, forming the specific alloys recited in claims 16 and 18 as being formed by mechanical alloying.

For all of the foregoing reasons, the combined teachings of Saito et al. and Takashima would not present a *prima facie* case of obviousness. Accordingly, it is respectfully requested that the rejection of the claims 14, 16, 18 and 24 be reversed.

Rejection for Obviousness Over Saito and Bartholomeusz

Claims 21-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito et al. in view of Bartholomeusz et al. (U.S. Patent No. 6,514,358). Claims 21-23 have been amended to be dependent on new claim 28, which in turn is dependent on claim 27. Claims 21-23 are directed to a precious metal magnetic sputtering target comprising a mechanically alloyed, chemically homogeneous alloy composition having microstructural homogeneity, said alloy composition comprising Pt, Co, Cr, and at least 6 atomic % boron.

Independent claim 27 and dependent claim 28 were added in an amendment after the final rejection. Even though the Examiner indicated that the amendment after final would be entered, he did not explicitly indicate the status of claims 27 and 28 with respect to this rejection. He indicated in the Advisory Action "that the amendment has been entered but the claims would be rejected over the combination of references cited." However, neither claim 27 nor claim 28 has been rejected in the final Office Action. Therefore, claim 27 and 28 are presumed to be allowable over the prior art. If claims 27 and 28 are allowable, then all of the claims dependent

thereon are allowable.

Assuming *arguendo* that claims 27 and 28 are not allowable over Saito et al. and Bartholomeusz for the same reasons given for the rejection of 21-23, the rejection is improper for the following reasons.

The arguments with respect to Saito et al. as set forth in the response to the rejections under 35 U.S.C. §§ 102(b) and 103(a), *supra*, are incorporated herein by reference. Saito et al. do not suggest mechanical alloying to form a target alloy having at least 6 atomic % boron, let alone an alloy comprising CoCrPtTaB or CoCrPtB. Bartholomeusz et al. do not make up for the deficiencies of Saito et al.

While Bartholomeusz et al. disclose sputtering targets comprising CoCrPtTaB or CoCrPtB (Bartholomeusz at col. 56-65), the reference fails to teach making these alloys by mechanical alloying. Bartholomeusz et al. disclose the conventional casting techniques (Bartholomeusz at col. 4:46-65). As pointed out *supra*, the mechanical alloying leads to alloy powder mixtures with extremely low chemical variability relative to sputtering targets made using conventional casting techniques. As demonstrated, in the Table on page 5 of the specification, the point-to-point chemical variability of a target made by mechanical alloying was significantly less than that of a target made by a conventional casting technique. This feature of the invention is not disclosed or suggested by the either Saito et al. or Bartholomeusz et al.

The Examiner concludes that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Saito et al. by utilizing a particular

composition as taught by Bartholomeusz et al. because it allows for depositing a magnetic material having increased PTO and decreased permeability.” Appellants respectively disagree.

Saito's process involves mechanical alloying of an alloy powder and a ceramic powder. Bartholomeusz et al. do not disclose using a ceramic powder containing boron in the initial mixture from which the alloy is formed. Further, there is no suggestion in Saito et al. of mixing, for example a CoCrTa alloy, with a boron powder. There is no suggestion from the combined teachings of the references that a person having ordinary skill in the art would have expected that mechanically alloying, for example a CoCrTa alloy with boron, would have resulted in a sputtering target alloy having the characteristics asserted by the Examiner because there is no teaching that Saito's process would produce sputtering targets having the asserted properties. Also, there is no suggestion in the prior art that that the mechanical alloying leads to alloy powder mixtures with extremely low chemical variability relative to sputtering targets made using conventional casting techniques, as demonstrated, in the Table on page 5 of the specification.

Furthermore, neither Bartholomeusz et al. nor Saito et al. disclose or suggest the specific alloys recited in claims 21-23. It has been difficult in the art to prepare Co-Cr-Pt-B sputtering targets having more than 2 atomic % boron, and especially more than 6 atomic % boron content, using conventional casting because the alloy tends to be brittle (see the specification in the paragraph bridging pages 2 and 3). Until the present invention, it was not known that an alloy comprising greater than 2 atomic % boron, and especially greater than 6 atomic % boron, could be prepared by mechanical alloying so as to provide an alloy that was not brittle and also provide

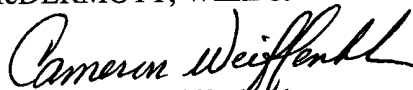
sputtered magnetic films having substantially the same composition as the sputter material. Neither Bartholomeusz et al. nor Saito et al. disclose or suggest the specific alloys recited in claims 21-23 having high boron content formed by mechanical alloying. Appellants disclose that mechanical alloying such boron alloys provides advantages over the conventional casting technique, e.g., increase in ductility and increased yields during thermomechanical processing, which translate into cost savings (specification at p. 11-16).

For all of the foregoing reasons, the combined teachings of Saito et al. and Bartholomeusz et al. would not present a *prima facie* case of obviousness. Accordingly, it is respectfully requested that the rejection be reversed.

Conclusion

Appellants submit that the Examiner has failed to establish a *prima facie* case of anticipation of the claims over Saito et al. or a *prima facie* case of obviousness of the present invention over the combined teachings of Saito et al. in view of Takashima or Bartholomeusz et al. Accordingly, in view of the foregoing arguments, it is respectfully submitted that the grounds of rejection of the claims on appeal is in error and should be reversed.

Respectfully submitted,
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APPENDIX

27. A precious metal magnetic sputtering target comprising a mechanically alloyed, chemically homogeneous alloy composition having microstructural homogeneity, said alloy composition comprising Pt, Co, Cr, and at least 2 atomic % B.

14. The sputtering target according to claim 27, wherein said alloy contains multiple phases comprising CoB, CoCrB, CoCr, CoPt, CoCrPt, and Pt uniformly distributed in the alloy.

16. The sputtering target according to claim 27, wherein said alloy further includes tantalum and said alloy comprises Co-20Cr-10Pt-2Ta-5B.

24. The sputtering target according to claim 27, wherein the atomic % of B ranges from 2 atomic % to 30 atomic %.

28. The sputtering target according to claim 27, wherein the atomic % of B is at least 6 atomic %.

18. The sputtering target according to claim 28, wherein said alloy comprises Co-19Cr-11Pt-8B.

19. The sputtering target according to claim 28, wherein said alloy comprises Co-15Cr-11Pt-10B.

20. The sputtering target according to claim 28, wherein said alloy comprises Co-20Cr-10Pt-6B.

21. The sputtering target according to claim 28, wherein said alloy comprises Co-10Cr-10Pt-20B.

22. The sputtering target according to claim 28, wherein said alloy comprises Co-12Cr-12Pt-18B.

23. The sputtering target according to claim 28, wherein said alloy comprises Co-12Cr-8Pt-22B.